



LAMPREY TECHNICAL REVIEW COMMITTEE

NH Instream Flow Pilot Program
New Hampshire Department of Environmental Services
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Lamprey TRC Meeting Minutes
Wednesday, March 7, 2007
2:00 pm – 4:00 pm
Conference Room, NH DES
29 Hazen Drive, Concord, NH

Members Present:

Ralph Abele
Douglas Bechtel
Brian Gallagher
Vernon Lang
Carl Paulsen, Vice Chair
Colleen Dreher
Robert Flynn
Ronald Rayner
Coleen Dreher

Technical Representatives

US EPA / Manager of NH State Program Unit
Conservation Interests, The Nature Conservancy
Business Interests, NH Water Works Association
US Fish and Wildlife Service
Conservation Interests, NH Rivers Council
Business Interests, Durham Boat Company
US Geological Survey
Business Interests, Business Industry Association of NH
Durham Boat Company

Members Absent:

Martha Fuller Clark
James Hewitt
Kenneth Kimball
James MacCartney, Chair
John Magee

NH Senate
Wright-Pierce
Appalachian Mountain Club
Trout Unlimited
Fish & Game

Others Present

Jeffrey Legros
Piotr Parasiewicz
Michelle Daley
Al Larson
Eileen Miller
Brian Giles
Jamie Fosburgh

Affiliation

NEIHP - UMASS
NEIHP - UMASS
University of New Hampshire
Normandeau Associates
LRAC
LRAC
National Park Service

DES Staff Present:

Wayne Ives, Instream Flow Specialist, Watershed Management Bureau
Lisa A. Fortier, Executive Secretary, Watershed Management Bureau
Paul Currier, Bureau Administrator, Watershed Management Bureau
Brandon Kernen, Hydrogeologist, Geological Survey

2:00 – 2:15 Open Meeting, Introductions and Approve Minutes of February 13, 2006 Meeting
Carl Paulson opened the meeting and everyone around the table introduced themselves.

- **Motion made by Carl Paulson to accept the meeting minutes of February 13, 2006, seconded by Coleen Dreher, there were no comments, and the minutes were unanimously accepted.**

2:15 – 2:30 Brief Update on Completed Task 4 Report and Schedule – Wayne Ives

Wayne –We haven't had a meeting in a long time because we were focused on the Souhegan process which is moving to the public hearing. It might behoove this committee to pay attention to what is going on in that process. Some of the people on this committee are also on the Souhegan Technical Review Committee and it wouldn't hurt to have this committee be aware of what is going on with the Souhegan. We have also been collecting data for the Lamprey assessment. We are finished with task 1, 3, and 4. The Task 4 Report was put out in final form in November or December of last year. The last meeting was about the Task 4 Report, which was in draft form at the last meeting. It went through the WMPAC and TRC review. The TRC had few comments and the report was revised with those comments. You should have received a notice of where to get the report. If you didn't receive a notice of the report they are available for you. The report describes the protected flow entities and identifies the flow needs for those entities. It also identifies the flow assessment methods that are intended to be used to evaluate those flow needs. The Report is a milestone that documents task 1 and task 3, which were identifying protected entities and whether or not they were on the river using site investigation up and down the river. Task 2 relates to the water management plan, looking at whether wells withdraw water directly from the stream or are mostly a groundwater fed system. That will be more important when we get to the water management plan. We are currently working in task 5, which is the flow needs assessment of the protected entities that were identified in the Task 4 Report. Today's meeting is to discuss the results and get feedback on the target fish community, stream flows of the last two years, which haven't gone to their lowest points, and to go over the MesoHABSIM assessment methodology. The MesoHABSIM model is the key component needed for identifying flows for fish, odonates and mussels. We wanted to present how the MesoHABSIM model works to make it clear. It is one of those things where the more you hear it the better you understand it and the more critical your review will be when you get to that point. Right now we are in the process of identifying protective flows using the field data that was collected last year. More information will gradually be coming out. We haven't had a meeting for a long time but if you feel the need for a meeting because too long a time has passed or you need to know something, please feel free to contact me directly with you questions or contact me or the chair or vice chair to suggest a meeting. If you feel the need to have a meeting because technical information is being presented or sent out that you feel deserves more discussion feel free to raise the issue of holding an additional meeting. I do not want to hold meetings when there isn't something well developed for you to look at, but if you feel the need for an interim meeting I am willing and glad to do that. I don't want to present partially developed information to you as something you need to review and then make you review it again when it becomes final. I am trying to minimize meetings but also maximize their efficiency. That does not mean we can't hold meetings in the interim to develop that thought process.

Carl Paulson – There are supposed to be two legislators on this committee and one of them didn't get reelected. What is their status?

Wayne – Representative Richard Cooney and Senator Johnson did not continue on in their offices. I have sent letters to the legislative leadership requesting replacements. I have not heard anything back. We intend to refill those positions. They were also members of the Senate Bill 330 committee, which is my oversight committee on this project. They represent a

loss on that committee as well. We haven't heard from the legislature who is going to be replacing them on that committee.

Carl – Legislative buy-in is somewhat important for this process. I would be happy to talk to folks over there.

Wayne – Frank Bishop said he couldn't attend. He is with the WMPAC but we invite all the members of the WMPAC to the TRC meetings. We do have the potential for new members to come. These meetings are open to the public. These are public hearings and the minutes are public documents. People can come and comment at meetings, whether they are members or not. We do represent the focus of the stakeholder groups.

Doug Bechtel - Can we follow up to Carl's point? If a WMPAC or member is lost, how does someone fill that gap?

Wayne – Dave Cedarholm is a member of one of the committees now because we lost Bob Levesque of Durham and Dave suggested himself in that position. If we had a volunteer like that I sent a nomination for them and put the process in the works. It is a very long process for the WMPAC, but not so long for the TRC. You do need to submit a nomination form. The nomination goes to the RMAC for their input. They forward it to the Commissioner, if they choose, and the commissioner approves it for the TRC or sends it on to the governor for WMPAC members. It is a fairly involved process. I try to keep up on it but we lost several members even before we started. Some of the members were on both committees. I have not been proactive in searching out people because it requires soliciting from a large group of organizations.

Carl – Is there any wisdom in sending out a list of the holes that exist on this committee?

Wayne - I can to that.

Ron –You are looking for replacements for the two legislators that are no longer on the committee? Do they have to be from that area or just a legislator who has the interest to do this?

Wayne – I believe in the case of the two that left the positions, the positions were ex-officio positions so they can be replaced by anyone the Senate leadership or Legislature select. It is up to the chairs of the Senate Environment Committee, RR & D Committee, or their designees.

Carl – We can encourage them.

2:30 – 3:55

NAI -- Draft Task 4 Report – Presentation of final IPUOCR's and draft assessment

a) Status of 2006 field work

b) Presentation of Target Fish Community uses and the proposed Lamprey TFC

c) MesoHABSIM – overview of process and input data

Piotr gave a brief introduction before Jeff's presentation.

Piotr – Jeff and I were working earlier for the University of Massachusetts, who were contracting on this project. We no longer work for UMASS. We work for Mount Holyoke College. This project is being conducted by the Rushing Rivers Institute. It is an organization we just created so we will be continuing as the Rushing Rivers Institute. I will turn it over to Jeff who will develop a target fish community for the Lamprey River.

Wayne Ives inquired if everyone had received the handouts.

Presentation

Jeff Legros – This handout was a memo to the committee that I sent out in February and it outlines the development process and status of the target fish community as it is and I will go over that.

Wayne – We didn't send it out to the TRC. We sent it to a subgroup. I think that this is the first time that the TRC is seeing this. We did have some internal review with the Fish & Wildlife Service, Fish & Game and I sent it off to Todd Richards at UMASS before we brought it to the TRC. So this is probably your first time seeing this in some cases.

Jeff - I am going to talk about most of the information that is in here anyway but the handout gives you something to take home and look at. For those of you who are not familiar with what a target fish community is it was developed initially by Mark Bain and Marcia Meixler in 2000 for an eco-hydrology study of the Quinebaug River in Southern Massachusetts and Connecticut. It uses fish data from quality reference rivers that have not been impacted to develop a reference community that would be symbolic of what a fish community should look like in an unimpacted stream. That target fish community can be used to evaluate the existing fish community of the study river, in this case the Lamprey River.

Piotr - Maybe the emphasis should be put on the target fish community that does not include all the fish that naturally would occur in a river but is what we would like to see in a river in the best conditions.

Jeff – Non-native fish are all excluded from the target community. The first step of developing a target community is to develop a full list of species that have the potential to occur within the Lamprey River or occur there currently or historically. Then there is the selection of reference rivers from which to get the data to develop the target fish community. It is really important that the rivers that we use as references are highly similar to the study to assure that the appropriate fish communities are developed as a result. We go through a multi-step process using GIS and a reference river selection model that was developed on the Souhegan Project. What this selection model is doing is taking input criteria and, based on the parameters of the Lamprey River, selecting all the rivers that meet the same parameters. What you end up with is a set of rivers that are physically similar to the Lamprey River. In the second process of the model similar rivers that are within the same level 3 zoogeographic ecoregion are selected. In this case, level three, Ecoregion 59. The next step, once you have the rivers that are physically and zoogeographically similar, is to select the ones that are the best ecologically. Impacted streams are not used because we expect them to have an impact on the fish community. I listed a few of the parameters that Margaret Kearns listed in previous studies that she did on the Housatonic River that define healthier quality rivers. They have few or no dams, no major water withdrawals, flow augmentations and they're primarily forested to a large extent. Those rivers would be expected to have healthy fish communities. What goes in first is the first set of rivers that we used the GIS layer developed by the Nature Conservancy. It is a full set of rivers, large and small, for the northeast, with over 75,000 stream segments. That full set of rivers was exposed to the first selection criteria, which was drainage area, stream order, gradient class, elevation class and percent calcareous geology. The next step was the ecoregion. You have an output of rivers that meet all that criteria. That output is then clipped based on that ecoregion, so what you have in the end is only rivers that are in the same geographic ecoregion and are physically similar.

Brian Giles – What does Clc. stand for on number five?

Jeff – That is the calcareous geologic. We are looking for the percent of calcareous geologic formations upstream of a certain sampling area. Limestone and things that are able to buffer the water to make it less acidic are calcareous geology. Depending on the percent upstream of a certain point is how the Nature Conservancy's layer has it classified. That would have an impact on the fish community. Some fish are less tolerant of acidic conditions so that was an important factor to put into the model. It affects the composition of the model.

Jeff – This is just the specific parameters of Lamprey River that went into that model for that selection criteria. The selection criteria were a stream order of four, size class of two, which is equivalent to a watershed area of 30 to 200 square miles. These classifications are macrohabitat classes that were developed by the Nature Conservancy and come from that GIS layer that we were using.

Vernon – On that slide where you have the acidic condition, is that the predominate condition on the Lamprey River?

Jeff – Yes, on the Lamprey River.

Vernon – Is that despite the high amount of calcareous that you show?

Jeff – The Lamprey is between 27% and 30% of calcareous geological formations for the whole study area and just below the end of the designated reach it becomes a size class three on the Nature Conservancy layer. At size three 30% or more would make it calc neutral but for size two less than 30% is acidic. The Lamprey never exceeded that designation of calc neutral in any study but it is on the high end of that.

Vern – Are there any tributaries to the Lamprey in the designated section that would change the criteria?

Jeff – All the tributaries come into play with the way the Nature Conservancy data layer is. It is calcareous geology above a certain point for the watershed coming into that stream.

Vernon – Are any tributaries well buffered?

Jeff – Some of the tributaries are but I know that there is calcareous geology in the region. Thirty percent is the very maximum high end of acidic, any more than that and it would have moved up into the next category which is calc neutral. It is a less acidic stream than a lot of other ones that are in that classification.

Carl – It sounds like that is based on GIS parameters or something and not necessarily real world data and actual measure of pH?

Jeff – No, we are only using this other data layer. There was no time to do any of that. The Nature Conservancy has a pretty extensive data base and they have put a lot of work into that. The aquatic classification work is as good as it is going to get.

Carl – It just seems that there is data on the Lamprey that could be checked, even just eyeballed to see if it fits.

Michelle Daley – Do you know what the acidic range for that pH would be? We have Newmarket, but I don't know off the top of my head what the pH is on the Lamprey along some of those reaches. Do you know what pH range is acidic beyond the specific geology concentrations?

Jeff – No I don't have that in front of me. Do you know Wayne?

Wayne – I am remembering that we did pH measurements in 2003 but I don't recall what the numbers were. I wouldn't imagine that they were too surprising because they didn't make an impression on me. I am guessing maybe somewhere in the 5 or, 6 range, possibly the 7's. That was in late August 2003, so it is not something I have at my fingertips.

Michelle – I'd say that is usually high 4's, 5's or low 6's.

Doug Bechtel – Do these numbers reflect just the reference reach or the water?

Jeff – These numbers reflect only the study area so from the area just above Wadley Falls to the town line.

Carl – Are you saying that is true of chemical class and the acid level too? It seems like what is coming downstream might have a big affect on that. That is what was confusing me there. Water quality in that stretch is going to be affected by what is upstream not necessarily the geology in that area.

Jeff – That is what is good about this measure is that everything coming down within the watershed is used. Everything above this sample point is this percent and as you go downstream the percent changes. At first look, after it was run through the model we came up with 65 river segments that match criteria and are suitable to use as reference rivers. They are spread out with a tendency towards coastal streams, but they are spread out through the ecoregion. We looked at that full set of rivers and we were able to determine which ones were ecologically healthy and suitable to use. Then the next step was to find which of those suitable rivers had adequate fish data that could be used to generate a model. The list was narrowed down considerably to eleven or twelve rivers. Finally, the ones that had the most suitable data and that didn't have any impacted fish communities were selected. The rivers

from south to north were the Eight Mile River, Wood River, Fort River, Nissitissit, Isinglass and Cocheco. The Eight Mile River drains into the bottom of the Connecticut River in southern Connecticut. The Wood River is in southern Rhode Island and drains to the west into Long Island Sound, not into Narragansett Bay. The Wood River is considered one of the most pristine rivers in the state of Rhode Island and is one of their best rivers. Up from there we have the Fort River, which is a tributary of the Connecticut and the Hadley River in Amherst, MA. I believe it is the longest undimmed tributary in Massachusetts of the Connecticut River. The Nissitissit, which is in Pepperell, MA, starts in Brookline, NH and runs southeast. Above that there is the Lamprey River, Isinglass and the Cocheco Rivers. The later two have a certain degree of impact. They both have dams and we might not have otherwise considered them but we were limited in what we had available. We looked closely at the fish community data and the sample sites that we used and there was no indication of an impact on the fish communities, which were healthy and robust.

Carl – At some point, the Isinglass, being a designated river may go through this process as well. It is being used as a reference reach for the Lamprey? How does that dovetail and should the Isinglass go through the same process. Does it become its own reference?

Wayne – We have this issue because we had a lot of data collected for the Lamprey. The question then is, “If we use the Lamprey as a reference for itself you create a circular reference and what you are trying to accomplish is what you already have. The Lamprey has been used for a reference river for that size river for a lot of studies simply because it is one of the better quality rivers and there are not a lot of undammed, undiverted, undeveloped watersheds of that size and the Lamprey is probably one of the better ones in New England in that coastal region. For these purposes, on the Isinglass, we would look at similar issues as far as watershed area, elevation, etc. We might use the Lamprey data for the Isinglass.

Carl – I understand that you want as much data as you can to make it as statistically defensible as possible but I am having a hard time wrapping my head around the possible circular reference.

Piotr – Using the Isinglass for the Lamprey doesn’t preclude us from using the Lamprey for the Isinglass. I don’t think that is an issue. We have seen in other studies that there is really nothing wrong with including Lamprey for the Lamprey if it is in good condition. We had a debate on this about the Eight Mile River Project. On the insistence of the reviewers, we actually removed the Eight Mile River data from the reference fish community and then figured out later that we would have been better off to leave it because the Eight Mile River was in better condition than all the other rivers that we used. You actually shoot yourself in the foot if you remove this data. This data has not been collected. Only on the stream, as we collected, in the past over a period of time. It actually does not really matter if it comes from the same river if it is good shape.

Wayne – The advantage of using the Lamprey on the Lamprey is that you have fish species that are there because it is a high quality river. They may not exist on some of these other rivers. The fact that they are there means they probably ought to be there and in some cases, as long as they are not exotic species, they may be one of the last places where those species are occurring and the reference rivers that you are looking at outside of that watershed may not carry those for one reason or another so you don’t want to limit yourself to say those species are not supposed to be there because they are not in other reference rivers. It is a balancing act. You have to think through the process and think what it is you are trying to accomplish. You shouldn’t make hard and fast rules because you don’t want to shoot yourself in the foot. None of the reference rivers are going to perfect. If we had perfect reference rivers we would only need one. What we need to work with is a number of reference rivers and hope to catch the missing spots in some rivers so that we don’t have gaps that are caused by a conditions in one river that aren’t matched in others. None of the rivers have the exact same drainage area, slope or geology.

Piotr - The fish samples are only a snapshot that is taken on one day, within the year, every few years, at one location. It is not representative of all the fish.

Carl - That is why you want more samples.

Jeff - To bring what Wayne is saying into this picture here, that was exactly the case with the Cocheco and the Isinglass River. If we hadn't included those rivers we would have missed two very important species that only occur in that habitat type that are known to be in the Lamprey and should be there, the bridle shiner and swamp darter. They are both listed in the NH Wildlife Action Plan that came out last year as species of concern. Without those two rivers they wouldn't have been part of the target community. They didn't occur in any of the other rivers so it was important to include those and have those species in the target community.

Carl - So was the Lamprey included in this one or not?

Jeff - No, it wasn't. The Lamprey is just there for reference so you can see where it is according to the other reference rivers.

Vernon - Which rivers were included?

Jeff - The Eight Mile River, Wood River, Fort River, Nissitissit and the Isinglass were included.

Jamie Fosburgh - I am curious if there is ever an effort to go back and look at historical records from early state surveys a century ago to look at species that may have been lost from these sites for some reason?

Jeff - We tried to look at historical data when we were developing our initial list of fish species. It was difficult because before a certain time there was loose data. Early surveys were concerned with mainly game species or were specific to a certain species. A lot of things that were in the river were missed and you are left wondering what was there.

Piotr - The streams were probably more impacted than they are now.

Jeff - Any other questions about reference rivers?

Brian Giles - Was consideration given to a fish passage around the Wiswall Dam? Of course, we would be getting the anadromous fish upstream. The intent would be to populate the whole upstream. What kind of weight was that given and have you identified this population?

Jeff - I will get to that later. There are some anadromous species that came up from the reference rivers that aren't in the target community but because a lot of those species are species that come in and leave. In some cases, the juveniles aren't even there for a full year. It is difficult to account for them in a target fish community but we left them in there as they were based on the samples we had both in the Lamprey and the reference rivers and at their appropriate proportions. We just said they could be more or less. Because they are pulse species, and sampling isn't always as accurate as for normal year round resident species, they are actually included in the target community. You will see that further on. This is the target fish community that we developed using those reference communities and the fish data from those reference rivers, common shiner, fallfish, American eel, common white sucker, long-nosed dace, and red breast sunfish being the top six species in that community. These same six species will be modeled for in the MesoHABSIM process. Piotr will talk about that later on. This is the same target fish community and the same species put into habitat use skills based on how they use habitat. Fluvial specialists are fish that use flowing conditions for their whole life cycle. Fluvial dependent species are fish that need access to fluvial conditions at some point in their life. To a lesser degree you have the macro habitat generalists at 19%, which are fish that can use a variety of habitats and are generally associated with pond species and non-flowing conditions. The 1% are anadromous species that are in the target community. Those species are blue-back herring, alewife and sea lamprey. Salmon and eels spend longer periods of time in the river so they are considered a resident species.

Brian Giles - Is that ammocoetes fish passage?

Jeff - It is very hard to come up with a number for these fish because when these rivers were sampled it is not likely that all of those fish are going to be in the water at that time. 1% is

probably a very low estimate because these fish come and then leave. The 1% is what was captured during sampling. It would probably be a much larger number if there was free passage and anadromous species were coming and going. At some time during the spawning run they probably make up a greater proportion than that 1% but because of the difficulties of sampling them that is what we have. We didn't want to manipulate those numbers, we just wanted to go by the data and leave it there, understanding that it is probably more during a full run.

Piotr – This is a good demonstration of why, in Connecticut, we shifted from developing target fish community to something we called reference fish community where we take into account under a presentation of anadromous fish and we synthetically correct the numbers based on data and expert opinion. Here, obviously, some species are not represented or underrepresented in the target fish community

Jeff – The reason why they are separated out is so they don't affect the comparison between other guilds so when I am comparing guilds from the target community to the guilds from the existing community so that these fish that we are unsure of aren't going to play a role in affecting those comparisons in any way. They are grouped together and separated out so that we can compare resident species from both communities without having interference or the unknowns of the anadromous species because the data isn't as good as the resident species. We have really good data from many different interests.

Vernon – You indicated you had sea lamprey in that 1% of anadromous pulse species. It is true that you can consider the adult lampreys coming in as a pulse but the juveniles spend years in that system.

Jeff – The reason why I grouped them together is sampling difficulties for the ammocoetes. We are not confident in the numbers. I am sure it is actually a lot more than we had so I grouped those at the other end so it didn't affect populations of the other fish.

Vernon – This is one of the issues that I was concerned about. I agree that unless you have the specialized gear to sample the Lamprey ammocoetes you could have real difficulty getting a reasonable picture of abundance. The same is true of going in and sampling for American eel. They are also very difficult to sample accurately. I noticed that you had an abundance level of 10% for American eel and a generic category for sea lamprey. It is an issue that we have wrestled with for years. I am curious as to why you didn't treat American eel and sea lamprey on the same lines?

Jeff – We felt that we had a good representation of eel. The numbers were similar from the Lamprey and the reference rivers and even though eel are difficult to sample they aren't nearly as difficult as sea lamprey. It is possible that the number of eel may be a little bit higher and if there was adequate passage it would be higher than that. We felt comfortable with the 10% in the target community and that there was a sufficient amount of data collected. We went ahead and kept them at 10% in the community. You can go back and forth with any of these numbers. It is the same with common shiner. You could say it should be down by 20% and fallfish should be the number one. It is not precise but I think that the eel numbers are where they should be.

Vernon – How did you classify eel?

Jeff – I classified eel as fluvial dependant because at some point they need access out of the river and then back in as a juvenile. Other studies have classified them as macrohabitat generalist but I looked closely at the Lamprey data and where they were found because I broke all the data down by section. By far, the majority of eel in the Lamprey occurred in fluvial running areas more commonly than the riffle sections and in very low numbers, if any, in the impoundments so I kept them as fluvial dependent species. I go back and forth on that one myself and I tend to go with fluvial dependent because without some fluvial conditions they won't have access back out to the ocean or back in as juveniles. I am comfortable with that but I know there is some difference of opinion on that.

Doug – Which ones in the target fish guild that you treated as anadromous?

Jeff – Alewife.

Eileen Miller – Do these percentages represent numbers or mass?

Jeff – They are abundances that are put through a weighted banking procedure. It is a spreadsheet and formula that was done by Mark Bain that uses a weighted ranking technique to come up with proportions. It is just not abundance. That assures us is that no one reference river has a stronger role in the final outcome than any other since the proportions are going to be slightly different in any reference river.

Wayne – We are working with datasets that are individual snapshots of time and those are only capturing certain fish. Some of them get away. They are all a little squishy. It takes away some of that squishiness by just generalizing. What you are looking at is the rank order of the most common species and identification based on the reference river sampling sites. What is expected to be most common and what is their distribution from highest to lowest?

Jeff – That was the target fish community developed from the reference rivers and what you are looking at now is the existing fish community of the Lamprey River. Common shiner was the most common in the Lamprey and was also number one in the target community that we developed and as you go down from there similar species are in the most abundant portion of the Lamprey existing fish community, as in the top part of the target community. The major differences being that the red breast sunfish is a lot higher in the existing community. Pumpkin seed and bluegill, non-native habitat generalists, are all shifted up higher. Red breast sunfish and pumpkin seed are also macrohabitat generalists. With the Lamprey existing community, broken down into those guilds, you see 18% fluvial specialists, 44% dependent, and 38% macrohabitat generalists, which is considerably more than was in the guild of the target community. The next step in the process is taking the two communities, the target community and the existing community, and putting them through a percent model affinity procedure developed by Novak and Bodie. What that does is allow us to evaluate the existing community based on the target conditions and the formulas. Percent model affinity gives you a percent value to say how similar the two communities are with 100% being identical and you can also compare sites or sections along the river. You can also apply it to the different guilds. I showed you the habitat use guild. There are also pollution tolerance and thermal regime guilds. We can eventually determine what specific species to look at and which species are underrepresented, overabundant or existing in proportions as predicted by the target community.

Wayne – Can you describe that a little bit?

Jeff – It is the sum of the absolute value of target proportions minus existing proportions. You are coming up with an absolute value difference between the target proportion and the existing proportion. One hundred minus half the difference and you come up with an absolute difference. That is then applied to the river. This gives you the affinity value.

Ron – What happens if the existing proportion is greater than the target?

Jeff – It is absolute value so it is still going to affect your affinity value and in that case you ask, “Should there be more or not?” In some cases you will have existing conditions have more of a certain species and that is not a bad thing in that case. On the Lamprey, if bridle shiner is higher than it was in the reference rivers you wouldn’t interpret that as a bad thing because bridle shiner was, and should be, there and may have been underrepresented in reference rivers. It doesn’t happen as often but it does happen.

Carl – It is the sum of each species?

Jeff – Yes, portions of each of the species.

Vernon – Has there been buy-in on the use of the percent model affinity process by the folks who are dealing with IBI?

Jeff – I don’t know about that because they are coming up with the metrics a different way and they are giving each species a certain value and summing it up. I think that is how their metric works for IBI. They have their comparison right there by a number so I don’t think they would want to use that.

Piotr - There are other metrics that compare distribution. We had one study on the Eight Mile River where we used percent similarity, through different metrics, and came up with very similar results. There was still no study that would determine the sensitivity and interpretation of the percent of similarities. It is still sort of a gray zone that hasn't passed across multiple rivers.

Wayne - IBI, for those who aren't fish biologists, are indicators of biological integrity. It is basically a way of comparing a river to see whether it is impaired or not. It is looking at different measurements of fish and asking how the fish community compares to a good fish community. It is very similar to comparing existing communities to the target communities.

Piotr - Our studies had these comparisons where we had values of 30%, 20%, all the way to our highest at 70%. We consider it good if it is more than 50%.

Jeff - Target fish community is fairly new. It was first used in 2000. There are a few things in it that need more work to find out if this is the best measure to compare fish communities or if there a better method. This is the only method that has been used in our fish community studies to date, but there is always room for improvement.

Carl - I am not sure exactly how you are using that. It seems like you are using it to compare the target with your existing but if your existing is highly impacted what meaning does that have? Why would you even bother with affinity?

Jeff - When we did the affinity on the Lamprey it came up with a 70% affinity, which means the existing community is in good shape and is similar to the target community we developed and that reference rivers that were used were highly appropriate. If you had poor reference rivers you wouldn't have a community that could compare right from the beginning.

Carl - This is where affinity wouldn't work if you had included the Lamprey.

Jeff - It would have been a little problematic.

Carl - That is circular reasoning.

Piotr - It is one of the six or seven samples taken at different periods of time. You are introducing some and it is a trade off.

Jeff - Remember what Wayne said about the Lamprey being used for other studies as a reference river. In this case, the Lamprey is being used as a reference river and be in better condition than any of the reference rivers. You have forget that you are looking at multiple rivers and look at it as one community because we are taking the fish from all of them and putting them through the calculation to get the target community.

Carl - Your population is six or seven because you have that many samples. That is a low sample size. It seems like you could run some sort of a statistic on how much the Lamprey affects that affinity.

Piotr - The sample size is higher because many of those rivers have had more than one fish sample.

Carl - But you are comparing them based on proportions you've adjusted with the weighted analysis so you really are comparing six numbers.

Ralph - To follow up with what Vern is saying, I think there is some debate on between Bain and the IBI community on whether this percent affinity should be used and I would like to follow up on that afterward. This is not as rigorous as an IBI. I think it has a lot of utility. The IBI world is another world.

Piotr - It is not intended to replace or compete with an IBI. It is just another tool for us to determine the quality of the fish community or give guidance on how impacted streams are. In our analysis, we do not absolutely rely on affinity number. We are more into visual comparison. In our case, the purpose of this is to compare how the habitat.

Wayne - I think the issue would be if you had a percent affinity that was very small and you said, "Why is the Lamprey River so dissimilar from all of these reference rivers that should be very similar to it? In this case, we see that it is terribly dissimilar so what we are hoping is that what we are comparing is reasonably good groups of reference rivers. The expectation is that

we are not too far off track when we are making the assumption that the reference rivers represent decent quality rivers and the Lamprey is fairly close to them.

Carl – I am sorry for all the questions but we are hoping that this is a model to use. I want to make sure that I understand it.

Wayne – That is what we are here for. Part of this meeting is for everybody to be on the same page in understanding what it is that you are looking at.

Colleen – Do you have data from any of your reference rivers from different times of year, temperature, flow and dissolved oxygen to see if there is major fluctuation between those?

Jeff – Yes and no, unfortunately most sampling is done in the summer months. That tends to be the field season for fisheries biologists. It is difficult to go out and sample river fish in the middle of the winter so most of the samples range from late spring to fall. Because we have multiple samples and multiple reference rivers we hope to account for that range but there is very little sampling done in the middle of the winter.

Piotr – You would open Pandora's box here. It is not only the temperature and flow and the time of sampling that impact the fish community today. It is whatever happened in the last month or in the entire season in the last year. We have to take a snapshot of the entire process that shapes the entire community. Even if we would have flow from today in sampling, it wouldn't say a lot.

Coleen - What difference would you see within the same river and sampling place at different times of the year with summer stratification, impoundments, etc.?

Piotr – Impoundments are not included in the target community.

Colleen – Didn't you say some of the rivers had impoundments?

Wayne – They made clear that all the reference rivers are all being sampled in riffle run segments, our wadable streams. In the actual community on the Lamprey, even though we had collected data from the impoundments, we didn't use the data in the existing community. We only used the comparable conditions.

Piotr– Impoundments are artificial waterbodies. If you are trying to establish a natural fish community this would be just noise and would be deceiving. Impoundments are not populated by fish found in a natural river.

Jeff – The Lamprey had a 70% affinity. The target fish community we created for Upper Souhegan a few years back was 61% and the Lower Souhegan was 54%. Looking at the target fish and only looking at affinity doesn't tell you a lot at all. One of the things I started to do with the Souhegan, and I did it on the Eight Mile and the Pomperaug, and now with the Lamprey, is not only comparing the target to the existing community with species but also putting more emphasis on the guilds and the comparison between the guilds: habitat reach, pollution toleration and thermal regime. Here we have the affinity applied by section. Section one through eight were fished by DES for the Lamprey baseline fish community study in 2003. The first section is above Wadley Falls, the second site is a short section just below Wadley Falls, the third is an area between that, the fourth is Lee Hook Road, the fifth is the impoundment above Wiswall Dam, section six is just below the Wiswall Dam, seven is Packer's Falls down to the pool, section eight, where there is a really low affinity value, is the impounded area below Packer's Falls to the end of the study area at the Newmarket town line. It really jumps out that the impounded area has a very low affinity value when you compare it to the target community.

Piotr – About 60 to 70% of the study reach is impounded versus flowing river.

Jeff – The falls side is a very large impoundment and the one above Wiswall Dam extends for quite a ways. Wadley is partially breached so it acts a little bit like an impoundment.

Piotr – I have to say a disclaimer here.

Jeff - Piotr doesn't like this comparison because when you develop a target fish community you are developing it based on multiple samples from all different habitat types from all these reference rivers so what you have is a community of the whole river or a large portion of the

river. What you are comparing it to here now is an individual site or section within a river. In this case they are sections and they are a little bit larger but you are still comparing it to one spot and a target community is representative of a whole river section.

Wayne – A target community wouldn't be something that, if you went out and sampled at any one location, you wouldn't expect to see that distribution of fish but if you were to sample a number of different locations up and down the river, then you might come closer to the target community. We have to be careful about what we talk about and what we actually mean by what we say. The target fish community is a tool for this process. Just because there is a different community of fish in the impounded section just above Newmarket doesn't mean that it is terrible conditions, it just means that it is completely different from the overall fish community.

Colleen – Shouldn't there be a target community for impoundments.

Wayne – You would think that would be the case but we need to focus our issues on stream flow and we have to be careful not to get diverted

Coleen – But it is 60% of the whole river that we are studying.

Wayne – The reason it doesn't have affinity is because it has non-flow dependent fish so we need to focus on the areas with flow dependent issues. This is why when we did the Task 4 report we separated out what was flow dependent and what was not. We are not worried about changing the geology because of our flows; similarly we are not worried about non-flow dependent fish because they are satisfied with most of the conditions that exist. We are focusing on things that are related to flow dependent issues and segments of the river.

Jamie Fosburgh – I am just curious, out of the 60 or 70% figure, as I think about it, the Wiswall impoundment is maybe long order and part of MacCallum this takes in above the Durham town line is maybe $\frac{1}{2}$ or $\frac{3}{4}$ a mile. All together you probably have two miles of impounded area.

Wayne – I think when you said 60% is really the deep water sections and not impounded by the two dams because there are sections of that river impounded naturally, like behind Lee Hook Road there is the riffle zone but above that there is a deep segment that is not wadable stream and the fish sampling was collected there using lake techniques, not wadable techniques. There is a large part of the river, which is the 60%, which is deep segments that are impounded behind existing dams or they are impounded behind natural bedrock so that there is a deep segment that is not a riffle, run or a pool. It is more like a lake.

Jamie – It seems like an important distinction because you give the impression that 60% of the area is behind the dam.

Wayne – I was trying to think that through because I remember that the number was correct but the circumstances were a little different. It is not impounded by the dam so much as it is impounded by naturally occurring rock outcroppings, or something along those lines, and the dams. It is combination of both of those.

Piotr – Yes, but whatever you see here in red is a free-flowing portion. Red does not signify an impoundment.

Jeff – Is eleven designated reach?

Wayne – It is twelve miles.

Jeff – If you have close to two miles above Wiswall Dam, and I believe it is impounded from the town line all the way to the bottom Packers Falls. It is a few miles, so you are looking at about 40% that is impounded from the impoundments.

Wayne – I don't think it is quite two miles, more like 8,000 feet behind the dam.

Doug – I want to make sure I get this correct, because I think this is important. Red is free flowing and blue is not necessarily behind a dam but impounded habitat condition.

Piotr – That is correct.

Doug – There could be a fall line that creates that upstream impoundment area.

Piotr – Yes, in some of them.

Carl – I thought that you said red was the impoundment area?

Jeff – I thought that because red was cut off. I thought that last red one was the bottom and it wasn't. He is right, it is blue is the bottom.

Carl – Blue is impounded then?

Jeff – Yes. Now we are getting into the comparisons between the habitat use guilds. When you compared the guilds for habitat use classification they had an 80% affinity. They were pretty similar other than an over abundance of macrohabitat generalists. The target was 19% and the existing was 38% for macrohabitat generalists. This is the same comparison only with the pollution tolerance of the fish species, which was 91% affinity and, in this case, pollution intolerant species were underrepresented. The existing fish community only had 1% and the target was 6%.

Brian Giles – Could you explain expected again?

Jeff – Expected is the target fish community values. I try to avoid the term targeted proportions because they are not necessarily targeting to meet those proportions because in the case of the Lamprey that might not be possible without significant changes because of dams and impoundments. It is the proportion that you would expect if the river was unimpacted.

Doug – I think one thing that is confusing is that the XFC. Someone that is not familiar with that term could think that this means expected fish community.

Piotr – There is no expected fish community. It was actually a good idea to change the name of target fish community to expected fish community.

Doug – We have existing and expected going in there.

Jeff – That is left over because I used the same template. In any of the reports that I have been doing for the last two studies I have avoided using that abbreviation. In the final comparison of the guilds we broke the fish down by their thermal regimes, meaning whether they are warm, cool, or cold water fish. For cool water a better word would be eurythermal or able to live in a wide variety of temperatures from the warm water to the cold water and somewhere in the middle they are happy, whereas warm water fish only want warm water and cold water fish only want cold water. In this case they were also similar with 80% affinity. There was a drastic overabundance of warm water species and a deficiency of cold water species.

Piotr – We have not processed temperature data from the last few years but we expect to.

Jeff – After comparing the affinity of the two communities as a whole and then comparing the affinities of the habitat use guilds we can also do some direct comparison with the specific species and look at which species overabundant or deficient, the existence of non-native species, amounts of non-natives or missed native species that were not included in the fish community. Some species such as the American eel, chain pickerel, Atlantic salmon were lacking. Species that were recorded within the acceptable range as expected were common shiner, fallfish, common white sucker, long-nosed dace, yellow perch and bridge shiner. The first four are four out of the six that were selected as important species for the MesoHABSIM modeling. It is good to see that they are in existing proportions to be expected. Redbreast sunfish and pumpkinseed were both overabundant. They are both native fish but they are macrohabitat generalists. Redbreast sunfish are associated more with rivers than pumpkinseed. They do like slow moving, lowland, low gradient rivers, so they are not a pond fish but they are a macrohabitat generalist. In a completely free flowing river you would expect less of them so they came out as overabundant. Brook trout, sea lamprey and creek chub and swamp darter were missing species. The brook trout is only at 1% in expected conditions and a lot of the Lower Lamprey isn't suitable for brook trout but according to the target community there could be small proportions of them there and they weren't there.

Bluegill, small mouth bass, large mouth bass, yellow bullhead, black crappie, rock bass, brown and rainbow trout were introduced species. Native species were present in the Lamprey but not accounted by the target community were golden shiner, alewife, and blue-backed herring.

Doug – Did you target macroinvertebrates?

Jeff - We did macroinvertebrates sampling, mussel surveys, and specifically macroinvertebrates EPT TAXA and odonates but we don't develop a model for those species

but we will do some modeling MesoHABSIM and assess suitability of habitats as long as our data is strong enough to do that. I think we sampled about 50 grids of invertebrate data.

Carl – Can we talk about alewife and blueback herring?

Jeff – I guess the 1% anadromous was only sea lamprey. They were not sampled at all in any of the reference rivers. Because they are pulse species and the adults are only in the river for a short period of time and the juveniles are migrating out in the late summer.

Carl – Why would alewife and blueback herring not have show up in any of the reference rivers for the Lamprey?

Jeff – They are harder to sample because they are year-round and they may not come up in every sample.

Carl – I would have expected them somewhere.

Jeff – I would have too.

Wayne – Aren't the anadromous species handled separately as opposed to identification by listing the whole side of the reference community in Baines process?

Jeff – Yes, depending on the management objectives, depending on whether they want to include them or not.

Piotr – They were separate.

Jeff – Excluded, it depends on management objectives if how he defined it in the paper.

Whether to include them depending on the parameter managed for on that river because there are so many variables that come into play that that limit or allow fish passage.

Vern – When we worked on target fish for the Ipswich River in Massachusetts we set them aside but identified them as a pulse group, which is really a subset of the dianadromous and anadromous species. It might also useful to recognize that in the lower part of coastal stream when you have anadromous pulse species present, as in the summer, they may dominate the whole system. That is not reflected here, as in the case of both Quinebaug and Ipswich.

Piotr – True proportions are not really reflected here either because eel and salmon are definitely under represented in the entire landscape.

Jeff – Especially on the Lamprey, sometimes during the year, these fish may dominate the community because they are there in high abundance for whatever period of time.

Piotr – That is exactly the reason for using reference fish community where we estimate the numbers and correct the model so that 2% of Salmon is not should be what is expected and corrected by ranking them appropriately. We decided not to do it in New Hampshire.

Jeff – I would have been a little more problematic if they had come up in the target community but not in the Lamprey. That sort of says these fish are able to be in the Lamprey as is now.

We kind of just went by the numbers and left the proportions that are there because it is clear that these fish probably are in reference rivers if they weren't sampled. We know for a fact that they definitely were in the Lamprey so they have potential to be there and they could only be there in higher numbers and not less. These numbers don't reflect actual proportion that will be there during a certain point in there. This is just the number that was sampled.

Because they are a pulse species their numbers cannot be accurately sampled.

Vernon - Someone made the point of asking about temperature and how that might affect them. When we were dealing with target fish community for the Ipswich we broke it out differently and just looked at Coastal streams from the Portland area down to the Cape. When you try to select reference rivers in that segment the Lamprey pops up as the one where you find mostly what you expect to find. One of the issues we dealt with, that you are not able to deal with effectively using this approach, has to do with the north/south gradient that exists. Two species that would come up are redbfin pickerel and chain pickerel. I am under the understanding that somewhere around the MA/NH border is the breakpoint. South of there the red fin is predominate and north of there it is chain pickerel country. You have a little bit of a break showing that but I am curious on how that might affect other species that show up.

Jeff – I took the two rivers that were closest to the Lamprey, the Isinglass and the Cocheco, and used only those to develop a target community and compared it to the existing community

of the Lamprey to see what I had and what the differences were. Then I compared it to all the rivers including the Eight Mile River, Wood River, and Fort River that drain into the Connecticut. Even though that difference exists it wasn't reflected in these reference rivers. We felt comfortable that it was ok to use the rivers that we used because using only the two rivers that were closest to the Lamprey was less similar than using all the rivers combined. We didn't see any major differences in species composition with the more southern rivers. I looked at that to make sure that the rivers we were using were ok to use knowing that difference might exist between the Gulf of Maine drainage and the Long Island Sound drainage and didn't see any major differences.

Vernon – When you do that did you just look at the top six species or did you look at the ones that were less commonly showing up?

Jeff – We mainly looked the top species to see where things were and if they had shifted and I also did an affinity so I kind of accounted for all the species to see how the affinity changed.

Vernon – Setting aside the American eel, I wouldn't expect to see huge differences from the top. We didn't see on in the Quinebaug study. When you looked at the species in the 1%, 2%, 3%, and 4%, this is also where you see these intolerant species showing up. I am curious if you would detect a difference if you just looked at the lower half of the table at those that comprise 15% to 20%.

Piotr – It was getting noisy. That is why Mark Bain just grouped them all together. Everything that was less than 1% he classified as other.

Jeff – Surprisingly, only looking at the ranks, with the way the spreadsheet is set up, you can add one reference river at a time. You have one and it ranks everything on the end. You have the second reference river and it ranks them. You have the third, and as I added or remove reference rivers, the species ranking did again. It didn't change much at all.

Wayne – We have to get to the next discussion. What is the plan for the report for this part?

Jeff – We will begin working on that as soon as this committee approves this target fish community and as long as there are no major exceptions and we are all in agreement than I can go ahead and move forward with the final report, following the same format as the Souhegan Report. It is pretty much just a breakdown of development methods and result which shows the comparisons that I have shown here.

Carl – Do have an idea on how long you expect this take? Are we at a point where we ought to think about reconvening?

Wayne – Vern, it may be that you want to discuss this in more detail.

Vern – I want to talk about eel.

Wayne – I think there are still some issues with the target fish community that we need to finish. We need to move on to the next presentation. If you are interested in this then we will present more documentation. I can send it out to the entire committee and you can decide if you want to review it or not but I know that, within the committee, Vern and maybe John Magee and several others are going to be interested in going into more detail. Let's plan on continuing this process. Anyone who has comments on the target fish community, feel free to present those as we send out information. At the next meeting we will have the final report pulled together and presented as a whole for the committee to review.

Ralph – I think to give justice to MesoHABSIM that it makes sense to try to do it today.

Wayne – If I understand it right this committee is going to stay focused on the target fish community until the end of the meeting and hold the MesoHABSIM discussion for another time?

Jeff – On the left, you see the proportions that each section accounted for, Sections 1-8.

Doug – Species or abundance?

Jeff – All the fish captured. It is the proportion of total that they account. Section 1, which is the top of the river above Wadley Falls, accounts for 13% of the fish were captured. On the right you have the proportion of non-native. The two I pointed out and put numbers on are the two impoundments. The red is behind Wiswall Dam and 13% of nonnative fish came from

site, 60% of non-native fish came from within impoundment at Section 8. 73% of the non-native fish came from two sections out of the eight. This makes me want to advance to a different study and look at other rivers to see if the impoundments alone account for that high of a total.

Carl – It is impoundments versus pools or deep water areas. I didn't get a sense of how the sampling data came from pools or similar areas.

Jeff – A lot of the Lamprey is slow moving pools, runs, and deepwater and that includes these other sites. The only major man-made impoundments are the two that I highlighted. Even the natural impoundment that account for large areas of the other sections don't have as high a proportions of non-native fish as the man-made impoundments.

Carl – How much sampling on the Lamprey versus the references came from the pool areas?

Jeff – The majority of the sampling was done by electro-fishing wadable streams. The goal of electro-fishing is to sample different habitat types within your stretch.

Carl – So it is not the deep water.

Jeff – No, the majority is not deep water.

Vern – Did you make a similar set of charts for where the macrohabitat generalists were located? Did you break down fluvial species versus macro-habitat species?

Jeff – No, I don't think a single fluvial species sampled in the lowermost impoundment at all but the majority of fish were non-native. In this case it would still look the same. A lot of non-native fish are also macrohabitat generalists. In section 8 the majority of fish were non-native as well as macrohabitat generalists. The non-native macrogeneralists were out competing the native macrohabitat generalists in the lower impoundment.

Doug – Does the MacCallum Dam have any upstream passage at all?

Al – It has a ladder.

Wayne – There is also a manual stocking as far as a truck. They stock some of the anadromous species by hand.

Jamie – I am still scratching head over Carl's point. The reference data from the other rivers was collected from riffle section and that is where the target fish community is and yet on the Lamprey we have deep water habitat. How are we dealing with that?

Jeff – It is not just riffles, shallow runs and pools that went into the samples used for the target fish community? The target fish community is giving you the community from a free-flowing stream. That is not what the Lamprey is so we are not trying to come up with what a community from a half impounded river would look like. We are coming up with what a non-impacted and non-impounded stream would look like and comparing it to one that is partially impacted.

Wayne – Maybe we need to stick the next point of what is we do with this to see if it makes any sense to do what we are doing with the selection samples.

Jamie – You added slides up there that showed how target fish community compared just to the blue and the red. How did you get those comparisons?

Jeff, - Typically with the affinity by site the affinity tends to drop down from what you have when you compare the two whole communities. We had a 70% affinity for the two communities. Typically, when you compare the sites it drops down. But surprisingly it didn't drop down as much on the Lamprey as it did in other studies. Even the sites had high affinities around 60%. Other than the last one they were all above 50. Even on the Eight Mile, which is considered to be in pretty good shape, affinity by site was lower.

Carl – It seems like the issue is that you are shooting for those fish in riffle that are most susceptible to flow.

Piotr – We tried not to have a total bias towards free flowing areas. Some of the samples are coming from pool areas. They do not have such a long backwater area behind natural falls like the Lamprey. Maybe it is not happening on other rivers but in the ground picture it should be close. One thing that we are excluding is man made impoundments. We don't want those in

our samples. The existing fish community should be representative to free flowing and pond areas.

Carl – In the cases of the Souhegan, you did two target separate communities for the Upper and Lower Souhegan because they were so different. Shouldn't that be the same way?

Piotr – No, because the community encompasses entire long stretches of river.

Jeff – The criteria that we used in the reference model showed gradient elevation. On the Souhegan they were completely different. You had a different stream order, gradient, and elevation. On the Lamprey it is the same all the way through except the lower part is impounded. When they did the draw-down for Wiswall Dam to inspect it you could see the high bank where the water level normally is. It is normally six or seven feet deep but with the draw-down it is below your waist and the majority of it is knee deep or less. Without that impoundment this habitat would be similar to the habitat that was sampled for the target fish community in the reference rivers. This would be able to be sampled with a backpack shocker wading in the stream. Without the impoundment the habitat would be similar to the habitat that was used to develop the target fish community.

Piotr – The purpose of developing this community is to select species that are basically our clients and they will tell us what this river should look like. We are going for those that are most abundant and most representative of the community that we find in this river. We disregard most of the low abundance species and assume that they are doing well. The underrepresented will be doing well too. For each of the species we will be developing habitat models. The species that are selected here are our well known clients and typical for most of the rivers we are working on and with the exception of redbreast sunfish, which usually does not make it into our community. This gives us some direction. We developed a suite of species for different seasons in the year. There is summer and the spawning seasons for the different species. We will eventually be developing the flows that protect the needs of the different fish. One other thing that the target community is good for is making similar comparisons between expected proportions of species in the target fish community that were found in the river as well as proportion of habitat that support this species. On the Souhegan we did not find brook trout even though it was expected and we found a lot of habitat suitable for brook trout. This told us something else was making brook trout disappear and figured out that it was temperature. Sometimes we find that habitat is a limiting factor and that is why they don't occur. We can simulate and improve this habitat to bring the river in the direction of supporting this species. If there is limited habitat for something, what is missing?

Coleen – You are proposing to change the river characteristics by placing trees?

Piotr – We might recommend something like removing dams.

Wayne – The focus here is on flow, not dam removal, as part of the Instream Flow Program.

Piotr – These are our ecological recommendations. The rest will be part of the Water Management Plan.

Wayne – This is a small component here. We are talking now about the MesoHABSIM process and the target fish community that goes into evaluating fish flows. Recreational flows are assessed in a different way. If we remove the Newmarket Dam there won't be a lake anymore for anyone to recreate in.

Paul – If you want to have a certain amount of fish habitat, flow might not be the most important thing in the equation. There are tradeoffs where you actually might be able to actually have more off stream water use if you did habitat modification in the stream and you could still wind up with the same amount of suitable habitat.

Carl – If you consider the other resources you are trying to protect.

Paul – They are each individual. We are talking about the biological integrity of fish habitat and we consider recreation separate.

Carl – But you can't necessarily be placing boulders without trading other factors.

3:55– 4:00

Other Business:

Action Items

Next Meeting – Wayne will e-mail with meeting preferences of attendees. They will meet in about a month. Please bring the colored handouts on MesoHABSIM to the next meeting. The Target Fish Community Report should be presented at the next TRC meeting in draft final form for approval or rejection. We will meet again with a small group to review the target fish community and discuss the MesoHABSIM model.

Wayne was asked by Dave Cedarholm, who is representing an affected dam owner on the Lamprey WMPAC and is a new member of the WMPAC for the Town of Durham, to convey his concerns about the Wiswall Dam's use as a water supply for Durham/UNH, the 401 certification process, and the IPOCR report. The 401 certificate will become the water management plan.

➤ **Carl Paulson made the motion to adjourn. All approved.**

4:15

Meeting adjourns